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Forest Trees of Canada

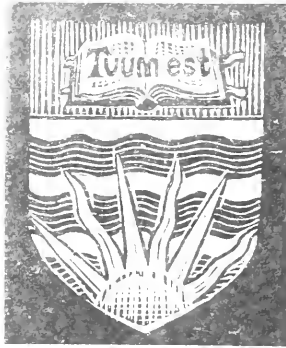
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THE
GEOGRAPHICAL DISTRIBUTION.
OF THE
FOREST TREES OF CANADA.

BY
ROBERT BELL, M.D., F.G.S., C.E.,
ASSISTANT DIRECTOR OF THE GEOLOGICAL SURVEY OF CANADA.

(FROM THE REPORT OF THE SURVEY FOR 1880.)

1882.

MONTREAL:
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THE NORTHERN LIMITS OF THE PRINCIPAL FOREST TREES OF CANADA, EAST OF THE ROCKY MOUNTAINS.

(Represented on the accompanying Map.)

On the accompanying map the general northern limits of the principal forest trees of Canada, east of the Rocky Mountains, are represented. The lines have been laid down chiefly from observations made by the writer during the last twenty-five years, extending from Newfoundland nearly to the Rocky Mountains, and from the northern United States to the eastern and western shores of Hudson's Bay. The limiting lines of the species which extend into the far North-west are drawn from information received from various officers of the Hudson's Bay Company, and from the data furnished by the accounts and maps of the different scientific travellers who have penetrated these regions. In the more southern regions, many details have been obtained from lumbermen and botanists which have helped to determine the lines with great accuracy in certain localities. Among the botanists may be mentioned Mr. A. T. Drummond, the late Dr. John Bell, Professors Lawson, Bailey, Macoun and N. H. Winchell, also the older botanists who have written on our flora. Thanks are due to my colleagues on the Geological Survey, Messrs. Richardson and Webster, for some facts on the distribution of trees in the Province of Quebec, and to Messrs. Fletcher, Ells and Broad, for others as to the Maritime Provinces, while Mr. A. S. Cochrane has made careful notes on this subject during our explorations in the North-west territories. To Captain William Kennedy, the Arctic explorer, now residing in Manitoba, thanks are due for valuable information as to the trees of the peninsula of Labrador, in different parts of which he spent a number of years in the service of the Hudson's Bay Company. The Hon. D. A. Smith, Mr. Robert Crawford, and others who have resided in the Labrador country, have also given notes on the timber, which have greatly facilitated the approximate determination of the limits of the species found in that large peninsula. Nearly all the reports of the Geological Survey, from 1857 to 1879, contain more or less information on the distribution of timber trees, but previous to the former year the writer had studied the forests of southern Ontario and the Ottawa valley. In a paper on the "Trees and Shrubs of Lake Superior," published in the Transactions of the Botanical Society of Canada in 1861, he pointed out a number of facts in regard to the geographical distribution of trees in

Authorities for
tree-line.

Far North-west

Botanists.

Geologists.

Capt. Kennedy.

Labrador.

Lake Superior.

- that region, which had not been previously observed. In 1873, the northern limits of our principal timber trees in the provinces of Ontario, Quebec, New Brunswick and Nova Scotia were laid down in colored lines on a large sheet, to illustrate a lecture before the Natural History Society of Montreal, by Mr. A. T. Drummond, on the distribution of plants in Canada. This sheet was loaned to the Department of the Interior, Ottawa, and some of the lines were transferred from it to the large map exhibited by the Department at the Paris International Exhibition of 1878. A reduction of the same sheet was published in 1879, to accompany a paper by Mr. Drummond in the report of the Montreal Horticultural Society and Fruit-Growers' Association. In the portion of the present map which includes the four provinces referred to, the tree-lines are all carefully revised and corrected. The northern limits of thirty of the principal species of our forest trees are outlined on this map, being as large a number as can be conveniently represented on so small a scale. About forty other species, however, besides shrubs, occur within the limits of the Dominion east of the Rocky Mountains. A list of these, with notes on their geographical distribution, is added to that of the species mentioned on the map.
- One of the principal uses of this map is to indicate the area within the Dominion throughout which each kind of timber exists. The abundance and quality of each kind varies much, of course, within these boundaries. Occasional or chance trees and depauperated representatives of some of the species shown on the map are known to occur beyond the limits laid down, but as these lines are intended to represent the general boundaries, they could not fairly be extended so as to include such cases. More or less extensive outliers or colonies of some trees occur in situations entirely separated from the main areas occupied by the species to which they belong. The southern boundaries of some of the more northern species, such as the white spruce, Banksian pine and balsam poplar, might be nearly included within the map, but to avoid confusion it is considered best to show only the northern limits. Most of our forest trees extend far to the south of the confines of Canada, so that at any point which we choose to select within the Dominion we are apt to find in the forest nearly all the species whose northern limits lie to the north of it. Professor Charles S. Sargent, of Harvard College, a special commissioner in connection with the tenth census of the United States, is preparing maps illustrative of the distribution of the woods, prairies and barren grounds of North America, and at his request the writer has had much pleasure in assisting him in this work as far as Canada is concerned.
- A knowledge of the limits of our different forest trees is also valuable as indicative of climate. Some of these will be found to correspond
- Original map.
- Thirty species shewn on map.
- Forty other species east of the Rocky Mts.
- Occasional occurrence beyond limits.
- Southern boundaries.
- Prof. Sargent.
- Other practical value of this information.

with the northern limits of the successful cultivation of particular crops. Certain trees cease to exist when they come to regions subject to severe spring or summer frosts, or where early autumn frosts prevent them from maturing their fruits. Locally, the presence of a particular group of trees is serviceable as a guide to the quality of the soil, but owing to differences in the character of the climate and other circumstances, it is obvious that such a test, although quite reliable within a limited area, may not be at all applicable to another region.

Some species appear to find their appropriate conditions in different latitudes by a change in their habitat: for example, the larch, balsam fir and white birch, which in the north grow freely on dry or hilly ground, towards the southern limits seek the cold ground in swamps. The white cedar and white pine in some places manifest the same tendency.

The appropriate temperature for the growth of a number of species is carried far to the south of their normal latitudes, along the elevated parts of the continent, especially the Alleghanies and the Rocky Mountains.

The range of any species is evidently not governed entirely by the mean annual temperature. The extremes of heat and cold in the west, as compared with the milder winters and cooler summers in the east, with about the same mean temperature for the year, appears to be the chief cause of the marked difference in the character of the woods in the two regions, since there is not a sufficient disparity in the amount of the annual precipitation to account for it. A great difference in the moisture of the air in two regions, otherwise resembling each other in climatic conditions, has also a powerful effect upon the growth of forests; and the dryness of the air in the western prairie and arid regions is, no doubt, the chief cause of the absence of timber. The proximity of the sea, especially where fogs or cold winds are of frequent occurrence, has a great influence upon the kinds and the size of the timber, and, in the north, upon the very existence of trees near the coast. Differences in the composition of the soil appear to have only a local effect upon the distribution of forest trees.

The study of the geographical distribution of the various forest trees of North America possesses a certain interest to the geologist as bearing upon questions in regard to the condition of the continent in later geological times. The outlines of the areas occupied by the different species, and other circumstances connected with their character and distribution, may throw some light on their dispersion from certain centres or lines, or possibly, in some cases, their contraction from wider limits; or we may find that some of them have still a tendency to advance or retire.

Great variety of trees in North America. The continent of North America possesses a great variety of forest trees. About 340 different species occur within the United States. All the kinds which we have in Canada, amounting to about ninety, including those of the Pacific slope, are also met with in that country. Some species are not only very widely diffused, but are also persistent over great areas, being found almost everywhere within the limits of their distribution, while others, although having an extensive range, are nowhere very common, and are sometimes absent for considerable intervals. Others, again, are confined to comparatively small tracts. As a general rule, the more northern species occupy the greatest extent of country, while the southern ones are progressively more and more restricted, even in a more rapid ratio than would be implied by the narrowing of the continent from north to south. This is owing to the great differences experienced in climatic conditions in going from east to west in the more southern latitudes. Along the northern borders of the forests of the continent the elevation of the land above the sea is comparatively slight and regular, and the other physical conditions are tolerably uniform. As a consequence, we find the most northern group of trees extending from Newfoundland into Alaska, a distance of about 4,000 miles.

Great areas occupied by northern species. An inspection of the accompanying map will show some interesting features as to the general distribution of our forest trees, as well as regarding almost every individual species of timber. For example, it will be observed that there is no material change in the woods throughout the great triangular area embracing about 600,000 square miles, of which the national boundary line between the Rocky Mountains and Lake Superior forms the base, and the Rocky Mountains and Laurentian hills respectively the west and east sides, the apex being at the mouth of the Mackenzie River. In the southern part of this area, a number of species are added to the kinds which everywhere throughout it make up the bulk of the forests, and again, few trees of any kind are found to the south of the North Saskatchewan; still, making allowance for local peculiarities of condition, there is a remarkable uniformity in the timber of this enormous area. It includes, however, only a few species, of which the aspen, balsam poplar and willows are more abundant towards the western, and the spruces, larch, balsam fir and Banksian pine towards the eastern side of the area.

Causes. It will be observed that the lines marking the northern limits of about a dozen species turn southward and become their western limits on reaching the eastern side of the valley of Lake Winnipeg and the Red River; while the boundaries of the species occurring next to the south of these also manifest a tendency to turn southward in approaching the prairies of the west. The species above referred to are the

Peculiarities.

Limiting lines turn southward towards Red River.

white cedar, black ash, white pine, red pine, sugar maple, yellow birch, red oak, white ash, hemlock, beech, ironwood, red cedar (arborescent variety) and white oak. They are to a great extent replaced by other species before the region of open plains is reached. Had the great forests originally extended further west, and been destroyed by fire or other causes, in comparatively recent times, we should have found the northern limits of these species continuing their general course to the prairie region, and ending abruptly there, instead of which they all curve gradually round, in a more or less concentric fashion, and other trees occupy the intervening ground. These well-marked features of forest distribution show that the present divisions of prairie and woodland are of very ancient date. The evidence of the smaller plants, and also of certain superficial geological conditions, all point to the same conclusion.

Replaced by western species.

The state of Minnesota is situated in a very interesting region in regard to forest distribution. Here we find the northern limit of the group to which the most southern trees of Ontario belong, such as the black walnut, shell-bark hickory, hackberry and Kentucky coffee tree; the north-western limit of the commoner trees of the northern states and of Quebec and Ontario, such as the white oak, red cedar (arborescent variety), ironwood, beech, hemlock, white ash, rock elm, red oak, yellow and black birch, sugar maple, red maple, wild plum, &c.; the western boundaries of some of the trees whose northern limits pass through northern Ontario, such as the white cedar, black ash, white pine and red pine; the southern limits of the most northern group, including the white spruce, the larch, Banksian pine, balsam fir, balsam poplar and canoe birch; and the general eastern limits of some of the western species, such as the ash-leaved maple, green ash, bur oak and cottonwood.

Forest distribution in Minnesota.

It will be observed that in the Labrador peninsula the tree-lines trend northward mid-way between the eastern and western shores. This is due partly to the unfavorable influence of the sea on either side, and partly to the beneficial effect of the central depressions in which the rivers run northward into Ungava Bay. From Mingan to Lake Superior, the height of land, north of the St. Lawrence, is rudely parallel to the general course of the lines marking the northern boundaries of the trees, and it may have had some effect in limiting the northward range of a number of species. A southward curve in the watershed about the longitude of Ottawa is marked by a corresponding curve in the tree-lines. Again, where a great depression occurs in this dividing plateau, some of the trees, which in such places may be approaching their northern boundaries, are found to extend, in the lower levels, beyond their general outline on either side. As examples

Trend of tree-lines in Labrador.

Height of land parallel to tree-lines.

Effect of depressions.

of this, the Lake Temiscaming and Abitibi district, and the valley of the Kenogami, or principal south branch of the Albany, may be mentioned. On the Missinaibi, or west branch of the Moose River, the white elm reappears 130 miles north of its general boundary on descending to a sufficiently low elevation above the sea. The Saguenay, for about 100 miles from the St. Lawrence, is really a narrow arm of the sea, and the country in the vicinity of Lake St. John, at the head of the river, is only slightly elevated above its level, and has a fertile soil, although surrounded by a mountainous region. Here we find an isolated colony of bass-wood, sugar maple, and other trees, considerably removed from the rest of their species. On the north side of Lake Huron and to the north of the city of Quebec, the land rises somewhat rapidly, and in both instances the tree-lines near these latitudes are more closely crowded together than elsewhere.

Approaching northern limits. Some kinds of trees, in approaching their northern limits, show a tendency to diminish gradually in size, and to become more and more scattered, rendering it difficult to draw any definite boundary of the species, while others vanish abruptly. The latter habit is more characteristic of southern than northern species, as far as the Dominion is concerned. The various species appear to die out more gradually as they range northward in the western than in the eastern regions.

Four groups. Forest trees east of the Rocky Mountains may be divided into four groups, as regards their geographical distribution within the Dominion: (1) A northern group, including the white and black spruces, larch, Banksian pine, balsam fir, aspen, balsam poplar, canoe birch, willows and alder. These cover the vast territory down to about the line of the white pine. (2) A central group of about forty species, occupying the belt of country from the white pine line to that of the button-wood; (3) a southern group, embracing the button-wood, black walnut, the hickories, chestnut, tulip-tree, prickly ash, sour-gum, sassafras and flowering dog-wood, which are found only in a small area in the southern part of Ontario; (4) A western group, consisting of the ash-leaved maple, bur oak, cotton-wood and green ash, which are scattered sparingly over the prairie and wooded regions west of Red River and Lake Winnipeg.

Richness in species. In the western peninsula of Ontario the forests present a remarkable richness in the number of species to be found growing together. In some localities as many as fifty different kinds may be counted on a single farm lot. A more varied mixture is probably not to be met with in any other part of the continent, or perhaps in the world.

In tracing the tree-lines across the continent in the comprehensive manner shown on the map, it will be found that most of them afford interesting peculiarities for study. A few facts will now be given in

regard to the geographical distribution of the thirty species whose northern limits, within the Dominion, are shown upon the map. They will be noticed in the order of their occurrence from north to south, and the lines traced from east to west. The common names used are those by which they are known in Canada. Thirty species enumerated in their order from north to south.

1. WHITE SPRUCE, SINGLE SPRUCE, SEA SPRUCE—Pine of the Hudson's Bay Company's people,—(*Abies alba*, Michx.)—This and the next are the most northern trees of North America. Abundant and of good size in Newfoundland and the Maritime Provinces, where it is sawn into deals. The Indians of these provinces call it "sea spruce" to distinguish it from the next. Captain Kennedy informs me that south of the limit shown on the map it is common in valleys and sheltered places throughout the Labrador peninsula. It nowhere reaches the Atlantic coast, receding further and further in going north. On the south side of Ungava Bay it is found at the mouths of Whale, George's and Ungava Rivers, large enough for building boats, but the trunks are short and apt to be knotty. In going up the east coast of Hudson's Bay it vanishes about latitude 57°, or a few miles above Richmond Gulf, but it is said to extend further north at a distance inland. On the west coast of the bay it extends to Seal River, in latitude 59°, from which the northward limit runs apparently almost directly north-west to near the mouth of the Mackenzie River, or about latitude 68°. According to both Hearne and Sir John Richardson, it is found on the Coppermine River to within twenty or thirty miles of the sea. Around James' Bay, and between this bay and Lakes Huron, Superior and Winnipeg, it attains a good size for lumber, and even on the Hayes and Nelson Rivers I have seen good, sound logs cut upwards of two feet in diameter, and showing from 100 to 140 lines of growth. Common throughout Quebec and Northern Ontario, but rare in the southern parts of the latter province. In the prairie country I have not seen it further south-west than Pine Creek, about 100 miles west of Winnipeg. White spruce.
Maritime Provinces.
Labrador.
Hudson's Bay.
Mackenzie River.

1a. BLACK SPRUCE, DOUBLE SPRUCE (*Abies nigra*, Poir.)—Professor Gray regards the white and black spruce as probably only varieties of one species, and there certainly appears to be every gradation between the two. The white spruce grows on rich intervale grounds, or near the shores of lakes and rivers; it becomes a moderately large tree, while the black spruce is found on hills and in cold swamps, and is a smaller tree than the other. The bark of the white spruce, when young, is smooth and grey, while that of the black spruce is brownish, and is always covered with small, loose scales, even when the trees are young. The two kinds have the same geographical range northward. Black spruce.
Differences.

2. AMERICAN LARCH, TAMARAC, RED SPRUCE, JUNIPER (*Larix Americana*, Michx.)—All the way from Newfoundland to near the mouth of American larch.

- the Mackenzie River, the northern limit of this tree is only a little to the southward of that of the spruce. It is found along with this tree on the shores of Ungava Bay. In Newfoundland, New Brunswick and the Gaspé peninsula it attains a good size, and is a valuable timber-tree on all the northern branches of the St. Lawrence and throughout the Ottawa valley, from which large quantities have been exported for ship-building, &c. It has an equally thrifty growth in the country to the south of James' Bay, and westward towards Lake Winnipeg. In this great region it attains its greatest perfection on the dry uplands and in good soil near the rivers, but smaller trees, with small black spruces, grow everywhere on the level or swampy grounds. South of the Ottawa it grows principally on low and level land.
- Larch exported.** 3. BALSAM POPLAR, BALM OF GILEAD, ROUGH-BARKED POPLAR, COTTON TREE, WHITE-WOOD, &c., (*Populus balsamifera*, L.)—Abundant everywhere around the Gulf of St. Lawrence and throughout a great part of the Labrador peninsula. Luxuriant, but not of large size, along
- Balsam poplar.** all the rivers of James' Bay and of the south-west side of Hudson's Bay, disappearing about Fort Churchill, from which its northern limit runs to about latitude 65° on the Mackenzie. On the east side of the bay small trees were seen as far north as Richmond Gulf. It is a very
- Hudson's Bay.** common tree, and of large size in the valley of the Mackenzie, especially on the Rivière aux Liards. It attains a considerable size around Lakes Huron and Superior, where the thick bark of old trees is used by the fishermen as a substitute for cork in making net-floats.
- Mackenzie River.** 4. ASPEN, COMMON POPLAR, TREMBLING-LEAVED POPLAR (*Populus tremuloides*, Michx.) A rather more southern tree than the last; very common throughout the whole region from the Gulf of St. Lawrence to near the mouth of the Mackenzie River. It extends
- Aspen.** over the southern half of the Labrador peninsula, and around James' Bay. On the south-west side of Hudson's Bay it keeps some distance back from the coast. It is the commonest tree in
- Labrador.** the prairie and half-wooded parts of the North-West territories. Throughout the Hudson's Bay Territory it is the principal fuel used by Indians and for open fires at the Company's posts, as it does not throw out sparks like the spruce and larch. In the Eastern Townships and elsewhere it is used for the manufacture of paper. Although the most
- North-West territories.** widely diffused tree of North America, it is relatively most abundant in the west, where it ranges from the Arctic regions to California. Professor Sargent remarks that it has "not yet been seen on the high peaks of the southern Alleghany Mountains, to which it might naturally extend."
- Most widely diffused tree of North America.** 5. CANOE BIRCH, WHITE BIRCH (*Betula Papyracea*, Ait.)—A very
- Canoe birch.** common tree along the northern tributaries of the St. Lawrence, and

ranging as far north in the Labrador peninsula as Lake Naskopie, and to within 250 miles, or perhaps less, of Ungava Bay, on the river of the same name. It attains its greatest perfection around the Gulf of St. Lawrence and in the Ottawa valley, and is also found of large size near Lakes Huron and Superior. In Labrador, on both sides of James' Bay and north-westward to the Mackenzie River, it affords sufficiently large sheets of bark for canoe-building. From James' Bay to the Mackenzie, which it strikes beyond the Arctic Circle, its northward boundary keeps near that of the aspen, being sometimes on one side of it and sometimes on the other. In the most southern parts of Ontario it is rare, of small size, and found only in swamps. In the Red River region it ranges as far south as the United States' boundary, and is found along the Assiniboine valley as far west as the Qu'Appelle lakes.

6. BANKSIAN PINE, SCRUB PINE, JACK PINE, CYPRESS (*Pinus Banksiana*, Lamk.)—This tree has not been noticed in Newfoundland, on the north shore of the Gulf of St. Lawrence, nor in the interior of Labrador beyond Lake Mistassini, although it may possibly have a somewhat more northern range in this peninsula than represented on the map. It occurs throughout Nova Scotia and New Brunswick. Starting from the head of the Bay of Chaleur, its northward limit appears to cross the other tree lines to the lake just named, from which it runs west to the Moose River, keeping about 100 miles south of James' Bay. From Moose River it runs north-west to the Mackenzie, which it crosses about the Arctic Circle. It does not touch either James' or Hudson's Bay. Southward it is common on the north shore of Lake Huron and around both shores of Lake Superior, whence it is met with all through the country to Lake Winnipeg. The area over which it is distributed appears to be in the form of a belt, with a breadth equal to five or six degrees of latitude, running across the continent. Although a small and scrubby tree in the southern and eastern parts of its range, in the central part (both as regards latitude and longitude) it attains much greater perfection. On the southern branches of the Albany I have seen large groves of these trees about seventy feet in height, and two feet in diameter at the butt, with straight trunks nearly free from branches for the first twenty or thirty feet.

7. BALSAM FIR, FIR, VAR, SILVER PINE, BLISTER PINE—"Palm" in Cape Breton—(*Abies balsamea*, Marshall.)—The Maritime Provinces, Newfoundland and the southern half of the Labrador peninsula, its northern limits in this region being on Naskopie Lake and the Ungava River. It flourishes best in the Gaspé peninsula, where I have seen many trees from twenty inches to two feet in diameter, with trunks tall enough to afford one good sawlog—about fifteen feet. It occurs around James' Bay, but its northern limit keeps to the south-west of

- Hudson's Bay, where it passes between Fort Severn and Trout Lake, and reaches the neighbourhood of the junction of the Shammattawa and Steel Rivers, which form the Hayes' River. From this point it turns south-west, and crosses the Nelson River at the outlet of Sipiwek Lake, from which it runs north-west to the Mackenzie River, crossing it about latitude 65°. South-west of Hudson's Bay it grows only in the warmest and best soils, and is entirely wanting in the cold, swampy tracts. In Ontario, where it is cultivated as an ornamental tree, I have not observed it growing naturally south of the latitude of Toronto. In the North-West territories it appears to be absent to the south and west of Lake Winnipegosis.
- White cedar.** S. WHITE CEDAR, CEDAR, ARBOR VITÆ (*Thuja occidentalis*, L.)—The geographical distribution of this species presents some very interesting features. In the Gulf of St. Lawrence region its boundary runs south-east from Anticosti to the Bay of Fundy, directly across all the intervening tree-lines. It is absent from Newfoundland, Cape Breton, Nova Scotia, and the eastern half of Prince Edward Island, but is unusually large and fine in New Brunswick and the Gaspé peninsula, in which the climate, soil, &c., are the same as in the adjacent regions, where not a trace of the species is to be found. From Anticosti the limit runs south-westward to a point about 200 miles north of Montreal. Thence it turns north-west and reaches Rupert's House, on James' Bay. From the neighbourhood of Moose Factory the line crosses the Albany River at some distance from the sea, and continues westward to a point about seventy-five miles south-west of Trout Lake, where it turns south-west and reaches the southern extremity of Lake Winnipeg; thence it turns southward to the United States boundary, keeping to the east of the Red River all the way. There is a remarkable outlier of white cedar brushwood around Cedar Lake, on the lower part of the Saskatchewan River, at a distance of 190 miles to the north-west of the nearest point of the main area covered by the species, and a few cedar trees are said to occur on Lake Winnipeg, not far from the mouth of the Saskatchewan. Captain Kennedy informs me that he believes the white cedar occurs in Labrador west of the head of Hamilton Inlet. If so, this outlier would occupy a position with regard to the north-east promontory of the cedar-line which would correspond to that of the Cedar Lake one to its north-western promontory. We might account for the singular fact that the white cedar has not yet extended itself eastward into Newfoundland and Nova Scotia by supposing that, in comparatively late geological times, when the land was lower or the sea higher, the Arctic current, which now flows through the Straits of Belleisle into the Gulf, passed on over the isthmus separating Nova Scotia from New Brunswick, and flowed through the Bay of Fundy. This
- Nelson River.
- Ontario.
- White cedar.
- Cedar absent.
- James' Bay.
- Lake Winnipeg.
- Outlier.
- Labrador.
- Supposed cause.

steady current of Arctic water, which would itself carry no seeds of trees, might prevent those of the cedar from crossing to the islands beyond it. But on this hypothesis it would be difficult to understand why the white pine, yellow birch and other trees, which are even more southern in their general habit than the species in question, should be found in these provinces. Difficulty.

9. BLACK ASH, SWAMP ASH (*Fraxinus sambucifolia*, Lam.)—In Anti-Black ash. costis and southern Newfoundland. From the neighbourhood of Seven Islands the northern limit runs west (curving slightly to the southward) to Lake Winnipeg. It is common, but of small size, along the different branches of the Moose River, especially towards the height of land. Moose River. St. Peter's portage, on the Missinaibi branch is the most northern point at which I have seen it in this region. I have found small trees around the southern part of Lake Winnipeg, but have never noticed it further west.

10. WHITE ELM, SWAMP ELM, GREY ELM, AMERICAN ELM (*Ulmus* White elm. *Americana*, Willd.)—With the exception of the northern group, this species has the widest range of any tree in Canada. It extends from the southern part of Newfoundland to the base of the Rocky Mountains. It occurs at the head waters of all the principal branches of the Moose River, and on one of them, the Missinaibi, I found an outlier within 120 Outlier. miles of James' Bay. On the Kenogami it extends to a point about half-way from Long Lake to the Albany. The northern limit intersects the east shore of Lake Winnipeg, and gains its highest latitude (about Most northerly range. $54\frac{1}{2}^{\circ}$) on the main Saskatchewan, where Mr. A. S. Cochrane last summer observed some good-sized trees not far from Cumberland House. Professor Macoun says he has "found it on Tail Creek, which discharges Buffalo Lake into Red Deer River, a branch of Bow River." Bow River. In the plain country, near the United States boundary line, the writer met In the plain country. with fair-sized trees in valleys in the Wood Mountains, and in different valleys to the northward of them. The trees in such situations are not visible from the table-lands until the brink of the valley is reached, and are locally known as "sly-woods." It grows to a large size along the Red and Assiniboine Rivers.

11. ASH-LEAVED MAPLE, BOX ELDER, RED RIVER MAPLE (*Negundo* Ash-leaved maple. *aceroides*, Mench.)—Does not appear to have been found native in Quebec or Ontario, although occurring in the eastern states. Young trees raised at Montreal from seeds brought from Manitoba are growing very Montreal. rapidly, and bearing seeds in the eighth year from sowing. In the North-West, Professor Winchell gives it as reaching the western extremity of Lake Superior. It is abundant in the Red River valley, Lake Superior. and extends north to the Dog's Head on Lake Winnipeg, beyond which the writer has not found it in that direction. It occurs along the main

- Saskatchewan and the south branch. The most westerly locality known is Tail Creek, which discharges Buffalo Lake, where it was found by Professor Macoun, along with the white elm. It is difficult to draw the geographical boundary of any tree in the prairie country, where timber of all kinds is so scarce, and therefore the lines on the map in this region are subject to correction.
12. GREEN ASH, WESTERN ASH (*Fraxinus viridis*, Michx.)—Common along the Red River in Manitoba, and extends north-westward as far as the Saskatchewan, in the neighborhood of Cumberland House. Mr. A. S. Cochrane writes that he found it abundant, but of small size, at the Birch portage, in this vicinity. I have met with it at the elbow of the South Saskatchewan, and Professor Macoun says he has not seen it west of the Cypress Hills, but that it extends east as far as Owen Sound, on the Georgian Bay. It occurs on the Lake of the Woods and along the Rainy River.
13. BUR OAK (*Quercus macrocarpa*, Michx.)—The limit of this species in Canada extends from the international boundary on Lake Superior north-westward to the north end of Lake Winnipegosis, from which it drops south to the Dakota line, in the vicinity of the Souris River. Professor Winchell writes that it is scattered all over the state of Minnesota. It attains a good size on the Rainy River and in the district between Lake of the Woods and Winnipeg River and the Red River; also along the Red and Assiniboine Rivers. On the English River it was first observed about half-way from Lonely Lake to the Winnipeg River. It extends northward on Lake Winnipeg as a tree to the Loon Straits, and as a bush to Beren's River. Small trees occur along the Swan River and north branch of the Assiniboine. Professor Macoun has not noticed it west of Spy Hill, near the Qu'Appelle River.
14. WHITE PINE—"Yellow Pine" of the British markets—(*Pinus strobus*, L.)—This and the next species have so nearly the same limit throughout the greater part of their northward range, that they are represented on the map both by one line. The red pine, however, does not extend so far east as the white, so that in this direction the line represents only the boundary of the latter. Contrary to popular belief, the white pine is confined to a comparatively small part of the Dominion, as will be observed by an inspection of the map. Its northern limit in Canada extends east as far as Mingan, while to the west it does not reach Lake Winnipeg, or Red River. It reaches its lowest latitude opposite to Ottawa City, about $48\frac{3}{4}^{\circ}$, and its highest, about 52° , in the Lonely Lake region. It occurs in favorable situations throughout the greater part of Newfoundland, but it is of best quality and most abundant along the Gander and Exploit Rivers on the north, and the Humber on the west side of the island. On the last named stream,
- Buffalo Lake.
- Green ash.
- Saskatchewan.
- Owen Sound.
- Bur oak.
- Dakota.
- Winnipeg River.
- N. and W. limits.
- White pine.
- Area of pine.
- Lowest and highest latitudes.
- Newfoundland.

I have cut into the centres of several good-sized trees, and found the wood of excellent quality. In the country immediately north of Lake St. John, the Messrs. Price have cut large quantities of fine white pine timber for export. When coming from Lake Mistassini to Ottawa, by way of the Gatineau River, Mr. Richardson, of the Geological Survey, first met this species at 230 miles north of that city. It occurs of fair size on the head waters of all the principal branches of the Moose River, and in former times is said to have extended considerably further north along these streams; but having been entirely destroyed by extensive forest fires, it has been replaced by other trees. Owing to these fires it is now very scarce in most of the region north of Lake Superior, but small groves of it have been observed as far north as represented. It is scattered over the country between Lake Superior and the Winnipeg River and around Lonely Lake, but it is of rather small size. In approaching Lake Winnipeg the limiting line of this tree curves south-westward, and crosses the Winnipeg River about fifteen miles above Fort Alexander, and then runs south to the United States boundary at some distance east of Red River.

15. RED PINE, NORWAY PINE (*Pinus resinosa*, Ait.)—As above stated, the northward range of this species and the white pine correspond so nearly, except towards the east, that for the present their limit is represented by a single line. It is not so common a tree in Canada as the white pine, and is usually found in rather small groves, although in the Ottawa valley they are sometimes pretty extensive. The white pine, on the other hand, may be found mixed with all other kinds of trees. It begins to disappear from the northern parts of the region of the white pine east of the longitude of Quebec, and is absent from Anticosti and Newfoundland. I have observed it in the Province of Quebec on the upper part of the Patapedia River, in the Gaspé peninsula, and Mr. Ells informs me that it is found on the Tobique River and on the New Brunswick and Canada railway fifty miles from St. Andrew's.

16. YELLOW BIRCH (*Betula excelsa*, Ait.)—The 49th parallel forms the average northern limit of this species from Newfoundland to the Red River valley, in which it curves round and runs southward. It grows to a good size in Newfoundland and the Maritime Provinces, where it is used in ship-building. Some of the trees whose northern boundaries are near that of the yellow birch in the east, gain much higher latitudes in the west. It ranges north of the height of land at Lake Abitibi, but is not found on the north shore of Lake Superior from Michipicoten to the United States boundary, and only small trees are found on the Canadian side of the line from this point to the Rainy River.

- Sugar maple. 17. SUGAR MAPLE, HARD MAPLE, ROCK MAPLE (*Acer saccharinum*, Wang.)—This tree, which was adopted as emblematic of Canada, is confined to the south-eastern borders of the Dominion. It is rather more southern in its tendency than the yellow birch. Some small trees have been noted at the head of Bay St. George, Newfoundland.
- Gaspé. It is found in sheltered places on the north side of the Gaspé peninsula, and is common in its southern parts, thrives well on the fertile limestone land of Lake St. John, and reaches Lake Temiscamang on the Ottawa; is abundant, but of a dwarfed description, on Michipicoten
- Lake Superior. Island and the hills on the east side of Lake Superior. Going north in this region, the last trees were seen south of the Long portage, on the Michipicoten River. It is absent from the northern parts of the shores of Lake Superior and northward. On the west side of the lake it re-appears on the south side of the lower part of the valley of the Kaminiſtiquia River, and thence the limit keeps westward, a little to the north of the boundary line, as far as Lake of the Woods, where it turns south. Sir John Richardson mentions this tree as occurring in the Saskatchewan region, but this is probably an error.
- Lake of the Woods.
- Red oak. 18. RED OAK (*Quercus rubra*, L.)—Nova Scotia, New Brunswick south of the Bay of Chaleur, Province of Quebec south of the city of the same name, and in Ontario to latitude 46°. On the north side of Lake Huron it is found for only a short distance inland. South shore of Lake Superior and at the eastern and western extremities. It has been said by one writer to occur on Michipicoten Island, but others familiar with the island have not observed it.
- Hemlock. 19. HEMLOCK, HEMLOCK-SPRUCE (*Abies Canadensis*, Michx.)—Eastward the northern limit of this species is at the Bay of Chaleur, but it is scarce near the eastern sea coast of New Brunswick. Very abundant in the northern part of Nova Scotia. It crosses the St. Lawrence a short distance below Quebec, extending further down on the north than on the south side. Thence it reaches the north end of Lake Temiscaming and the eastern extremity of Lake Superior at Agawa, south of the Michipicoten River. On the south shore of Lake Superior it does not reach the western extremity, turning southward in the neighborhood of Ashland. I am informed, however, that there is an outlying grove of hemlock at Thompson, about twenty-five miles west of Duluth. This tree maintains a good size to the verge of its range, and always appears to terminate abruptly. Sir John Richardson states that it grows on the Kaminiſtiquia River. This, however, appears to be an error. I have never seen it or heard of its occurrence near this locality.
- Lake Superior.
- Basswood. 20. BASSWOOD, LINDEN, WHITE WOOD (*Tilia Americana*, L.)—Common in Nova Scotia and New Brunswick, except the northern part, not

having been noticed beyond the southern branches of the Restigouche, ^{Gulf of St. Lawrence.} The northern limit seems to reach the Gulf south of Miscou, from which it runs west to near Quebec, and thence in a pretty direct course to the eastern shore of Lake Superior. It is wanting around the northern parts of this lake, but re-appears just south of Thunder Bay, from which it nearly follows the international boundary to Lake of the Woods. Here it bends north-west, and almost gains the southern extremity of Lake Winnipeg, the last trees seen in that direction being at East Selkirk, on the Red River, where they are very small. Westward it is ^{Red River.} found along the Assiniboine to a short distance above Fort Elliee.

21. BEECH (*Fagus ferruginea*, Ait.)—Throughout Nova Scotia and in ^{Beech.} New Brunswick to the Bay of Chaleur, except on the coast of the Bay of Fundy. The northern boundary crosses the St. Lawrence a short ^{Bay of Fundy.} distance below Quebec, and thence runs west to Lake Nipissing and the outlet of Lake Superior. On the south shore of this lake it occurs ^{Lake Superior.} as far west as Grand Island, but it seems to disappear from the immediate neighborhood of the lake before reaching L'Anse. Sir John Richardson says this tree occurs on Red River of Lake Winnipeg. If so, it must be south of the Canadian line.

22. WHITE ASH (*Fraxinus Americana*, L.)—Found throughout Nova ^{White ash.} Scotia and in New Brunswick, except the northern part; also in the southern parts of Quebec and Ontario, its northward range corresponding nearly with that of the beech. It occurs along the southern, but not on the northern side of Lake Superior.

23. IRON-WOOD, HOP HORNBEAM—Lever-wood of the Eastern Townships (*Ostrya Virginica*, Willd.)—Nova Scotia and the greater part of ^{Ironwood.} New Brunswick, the northern limit being on the Bay of Chaleur, from which it runs to near the city of Quebec, and reaches Lake Huron at the mouth of the French River. It has been seen on the Manitoulin Islands, but not to the north of Lake Huron. Sir John Richardson mentions it as occurring on the Winnipeg and Red Rivers, and I have noticed it on Lake of the Woods and the lower part of the Assiniboine River.

24. BLUE BEECH, AMERICAN HORNBEAM (*Carpinus Americana*, Michx.) ^{Blue beech.}—This small tree does not range quite so far north as the last. It has not been noticed on the north side of Lake Huron, nor anywhere around Lake Superior.

25. WHITE OAK (*Quercus alba*, L.)—In the southern parts of Nova ^{White oak.} Scotia and New Brunswick, in both of which it is rare. More common in the southern districts of Quebec and Ontario. A very valuable timber tree in the Ottawa valley, below the Mattawa, and throughout south-western Ontario, from both of which regions large quantities have hitherto been exported to foreign markets.

- Red cedar. 26. RED CEDAR (*Juniperus Virginiana*, L.)—The arborescent form of this species is found in none of the provinces except Ontario. Its northern limit begins on the Atlantic coast about the eastern part of the state of Maine, and runs west near the parallel of latitude 45°, crossing the St. Lawrence about mid-way between Montreal and Lake Ontario, and reaching Lake Huron at Parry Sound. In the early days of the settlement of Upper Canada large quantities of this wood were cut in the neighborhood of Kingston and the Bay of Quinté, and shipped out of the country. The prostrate variety (*J. humilis*, Hook.), is found in all the provinces, and is common in sandy and gravelly soil in the North-west prairie country. It also occurs in dry and rocky places along rivers and lakes in the wooded regions of the Hudson's Bay territories, as far north as the mouth of the Nelson River.
- Former abundance near Kingston.
- Prostrate variety.
- Butternut. 27. BUTTERNUT (*Juglans cinerea*, L.)—Said to be found in Nova Scotia on the east side of the Bay of Fundy. Occurs in the southern counties of New Brunswick, especially King's, and along the St. John River above Woodstock; absent from the coast and northern part of this province; in the St. Lawrence valley, nearly as far down as the city of Quebec, and along the Ottawa up to the Madawaska, from which the northern boundary runs to the Georgian Bay. Large trees are found in a few places in the county of Grey, not far from this Bay.
- Bitter hickory. 28. BITTER HICKORY (*Carya amara*, Nutt.)—Ranges over a much larger area in Canada than the shell-bark hickory, being found around Montreal, in the Eastern Townships and along the lower part of the Ottawa valley, and thence westward throughout the southern part of Ontario to Lake Huron.
- Black walnut. 29. BLACK WALNUT (*Juglans nigra*, L.)—This tree is confined to the tract lying south of a line drawn from the head of Lake Ontario to near the outlet of Lake Huron.
- Chestnut. 30. CHESTNUT (*Castanea vulgaris*, Lam., var. *Americana*, A. DC.)—In the district along the north side of Lake Erie, and north-eastward to the north shore of the head of Lake Ontario.

THE GEOGRAPHICAL DISTRIBUTION OF TREES OCCURRING IN CANADA
BUT NOT REPRESENTED UPON THE ACCOMPANYING MAP.

1. TULIP TREE (*Liriodendron tulipifera*, L.)—At Niagara Falls and in some localities westward near Lake Erie.
2. SILVER MAPLE, WHITE MAPLE (*Acer dasycarpum*, Ehrh.)—Eastern Townships and province of Ontario south of latitude 45°. Generally confounded with the red or soft maple.
3. STRIPED MAPLE (*Acer Pennsylvanicum*, L.)—This small tree, although everywhere scarce, has much the same range in Canada as the

sugar maple, being found from Gaspé to the outlet of Lake Superior; also with the sugar maple at Lake St. John.

4. MOUNTAIN MAPLE (*Acer spicatum*, Lam.)—The most northern species of maple. Ranges from Newfoundland to James' Bay, and north-westward to Island Lake on the waters which reach the sea at York Factory. The last locality at which it was seen in this direction is George's Island, in Lake Winnipeg.

5. BLACK MAPLE (var. *Acer nigrum*, Michx.)—Identified by the late Dr. John Bell as occurring at Grenville, on the Ottawa.

6. SOFT MAPLE, RED MAPLE (*Acer rubrum*, L.)—A common tree throughout the Maritime Provinces, and in Quebec and Ontario south of latitude 49°; has a slightly more northern range than the sugar maple.

7. KENTUCKY COFFEE TREE (*Gymnocladus Canadensis*, Lam.)—Said to occur in southern Ontario. Professor Winchell informs me that it is found in the southern part of Minnesota.

8. WILD PLUM (*Prunus Americana*, Marshall.)—The northern limit runs from near the city of Quebec to the eastern extremity of Lake Superior. It occurs on the Rainy and the Red River and the lower part of the Assiniboine, and at the south end of Lake Manitoba.

9. PIGEON CHERRY, SMALL RED CHERRY (*Prunus Pennsylvanica*, L.)—Very widely diffused; has a high northern range, small examples extending in most regions nearly to the verge of the timber.

10. BLACK CHERRY (*Prunus serotina*, Ehrh.)—Formerly a valuable timber tree in the lower Ottawa region and south-western Ontario; very fine in the county of Bruce; now nearly exhausted.

11. MOUNTAIN ASH, ROWAN (*Pyrus Americana*, De C.)—Abundant and of good size in all the Maritime Provinces, Anticosti and Gaspé; thence it extends westward, the northern limit touching James' Bay. Further west it is found of small size as far west as Island Lake, on the Shamattawa, and to White Mud Falls, on the Nelson River, seventy or eighty miles below Lake Winnipeg. This tree, which is of a northern habit, probably attains its greatest perfection around the Gulf of St. Lawrence and Lakes Huron and Superior.

12. SCARLET-FRUITED THORN (*Crataegus coccinea*, L.)—Common in the southern and central latitudes of Quebec and Ontario, but its northern limits have not been accurately ascertained. Between Lake Superior and Manitoba thorn bushes grow as far north as the international boundary, but not much beyond it. Thorn bushes, apparently belonging to this species, were found by Mr. Cochrane on the Grassberry River, twenty or thirty miles north-west of Pine Island Lake.

13. COCKSPUR THORN (*Crataegus crus-galli*, L.)—Ontario, except the more northern parts. In Manitoba a thorn which appears to be identical with this species is abundant.

14. BLACK THORN (*Crataegus tomentosa*, L.)—In the southern parts of Quebec and Ontario.

15. FLOWERING DOG-WOOD (*Cornus florida*, L.)—In southern Ontario only. Most common apparently at Niagara Falls, and westward to the valley between Dundas and Ancaster, but rarer on the higher grounds.

16. SOUR-GUM (*Nyssa multiflora*, Wang.)—Dr. Hurlbert informs me that this tree grows in some parts of southern Ontario, but I have not observed it myself.

17. SASSAFRAS (*Sassafras officinale*, Nees.)—From the Niagara River to Ancaster, near the head of Lake Ontario, and probably other parts of southern Ontario.

18. SLIPPERY ELM (*Ulmus fulva*, Michx.)—Southern parts of Quebec. Along the Ottawa River for 200 miles, above Montreal; small and rather scarce. In Ontario as far north as Georgian Bay.

19. ROCK ELM (*Ulmus racemosa*, Thomas.)—Eastern Townships, Lower Ottawa valley and province of Ontario south of latitude 46°. Formerly common, but most of the finest trees in all these regions have been cut for export.

20. BUTTONWOOD, AMERICAN PLANE-TREE (*Platanus occidentalis*, L.)—Around the head of Lake Ontario and in the western peninsula, especially along rivers such as the Grand, Thames and Saugeen.

21. SHELL-BARK HICKORY (*Carya alba*, Nutt.)—In the southern part of Ontario; rather common in some localities. The brown hickory (*C. porcina*) and the white-heart hickory (*C. tomentosa*) are also believed to occur in the same region.

22. SWAMP WHITE OAK (*Quercus bicolor*, Willd.)—The white oak of the low lands in the Ottawa valley and southern Ontario appears to belong to this species. Near Dundas I have also seen what I took to be the black oak (*Q. tinctoria*, Bartram.)

23. WHITE BIRCH (*Betula alba*, L.)—This species, which is often mistaken for the canoe birch, occurs in the Maritime Provinces, and in Quebec as far west as Montreal, and probably further.

24. BLACK BIRCH (*Betula lenta*, L.)—Often confounded with the yellow birch. Occurs in both Nova Scotia and New Brunswick. Identified in Gaspé and other places in the Province of Quebec, and in Ontario as far west as the Manitoulin Islands.

25. BLACK ALDER (*Alnus incana*, Willd.)—Abundant along streams everywhere from Newfoundland to the Saskatchewan, and as far north as the forests extend, but not in the southern parts of Ontario. In the Hudson's Bay territories it is often called "black willow." The green alder (*A. viridis*) has also been noticed, although not so common as the black, from Newfoundland to Lake Winnipeg, and northward to the verge of the forests around Hudson's Bay.

26. WILLOWS.—The willows have not been identified with sufficient specific accuracy in the various regions in which the aborescent forms occur to map the geographical range of the different species.

27. LARGE-TOOTHED POPLAR (*Populus grandidentata*, Michx.)—Of a southern habit compared with the aspen. Its northward range is somewhere between that of the sugar maple and the white pine. Abundant in New Brunswick and Gaspé. It does not extend west as far as Manitoba.

28. COTTON-WOOD (*Populus monilifera*, Ait.)—Large trees occur along the Assiniboine River.

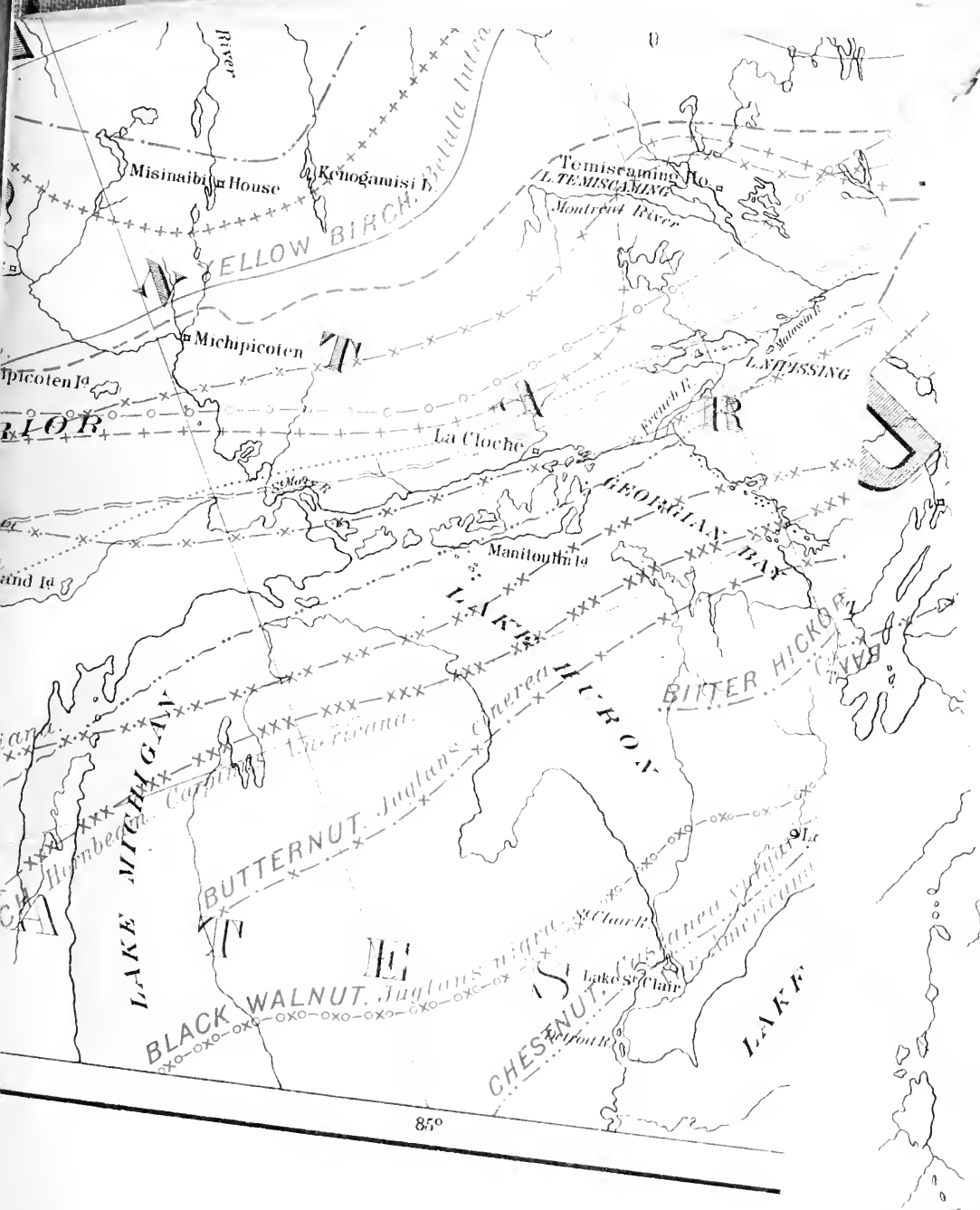
29. *Pinus contorta* (Dougl.)—Western part of the North-west Territories.

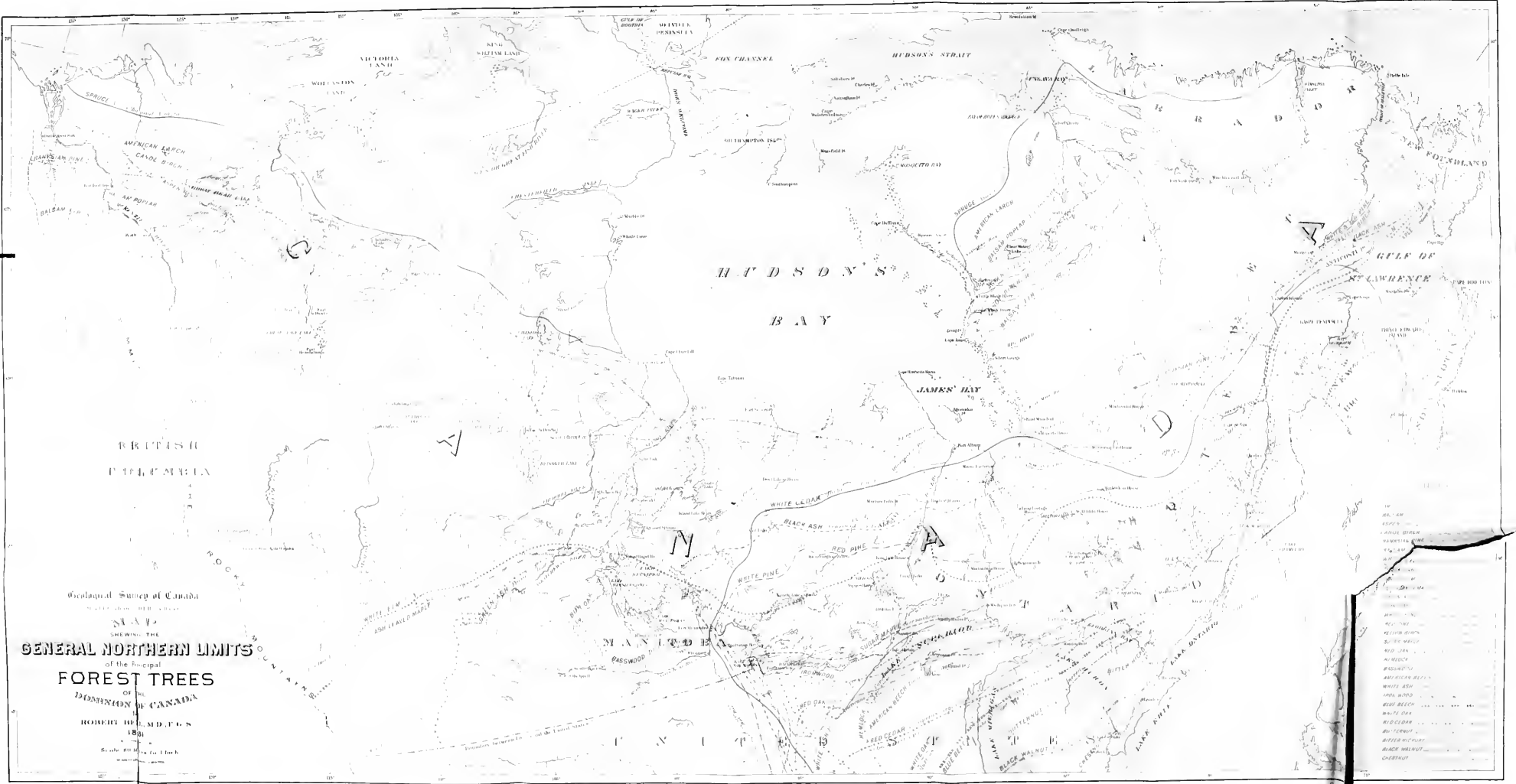
30. PITCH PINE (*P. rigida*, Mill.)—In some places in the Ottawa valley, and at the Thousand Islands on the St. Lawrence.

31. ENGELMANN'S SPRUCE (*Abies Engelmanni*, Parry.)—This tree, which is known to extend as far east as the Black Hills of Dakota, is said to occur also on the upper waters of the South Saskatchewan.









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